Root Power

Grades	K-6
Duration	1 week
Setting	Classroom

TEKS

Science – Ch112

K.1	K.2	K.3	K.4	K.5	K.7	K.10	1.1	1.2	1.3	1.4	1.5	1.7	1.10	2.1
2.2	2.3	2.4	2.5	2.7	2.10	3.1	3.2	3.3	3.4	3.5	3.7	3.10	3.11	4.1
4.2	4.3	4.4	4.5	4.7	4.11	5.1	5.2	5.3	5.4	5.5	5.7	5.12		

Focus Demonstrate roots as erosion inhibitors.

➲ *Read side 2 for* Background.

Objective The student's task is to test how the effect of water erosion on planted and unplanted soil.

Procedure

1. Working in pairs, have students cork the hole in each erosion tray and fill the tray with potting soil to two-thirds of each tray's grid.
2. Now the students can moisten the soils; gently smooth and slope the soil so that it leaves three rows of squares uncovered at the hole end of the tray. Set one tray aside.
3. Next they can evenly sprinkle a spoonful of the grass seed over the soil in one tray; lightly cover the seeded tray with plastic wrap. *Don't press the wrap into the soil or against the seeds.*
4. The students should place the seeded tray in an area with plenty of light, but where it won't dry out the soil.
5. When the grass shoots are pressing against the plastic wrap the trays are ready. Now the class can replace their tray's cork stoppers with the rubber stoppers.
6. Moisten and smooth the soil in the unplanted tray.
7. Have the students insert one end of the plastic tubing into the rubber stopper, as the other end leads into the bucket.
8. Elevate both trays 3cm (1.25in) at their un-tubed end. Ask the students to speculate what will happen in each tray when we simulate rain. Predictions should be recorded in their Journals.
9. Using the measuring cup, pour water slowly back and forth along the top of the seeded tray. Continue pouring until water reaches the bucket. Using the same amount of water, repeat Step#9 on the unplanted tray.
   - *What is observed?*
   - *How does erosion compare in the two trays?*
   - *How do roots help prevent erosion?*

Materials

per student pair

1	measuring cup
1	Journal page
1	pkg of seeds
1	plastic spoon
2	rubber stoppers with hole
2	corks/stoppers
2	pieces of plastic tubing
1	roll masking tape
2	erosion trays
1	bucket
	plastic wrap
	books
	paper towels
	potting soil

Did You Know?

In 1850, there were more than 150 glaciers in Glacier National Park. By the late 1990s, there were fewer than 50. –At this rate of recession, all of these glaciers will be gone by 2040.

Melting glaciers & polar ice have already raised sea levels 4in to 8inches since the mid-1800s.

➲ *Read side 2 for* Background.

Root Power

Background

Two processes continually occur on Earth: those that modify it or build it up, and those that break it down. Forces such as volcanic eruptions, earthquakes, and the movement of magma continually push up and create new land, while forces such as weathering and erosion wear down the land. Erosion occurs when wind, water, and glaciers move weathered particles to other locations. The process is powerful enough to form deep valleys, as well as level hills and mountains.

Mechanics of Erosion

Soil erosion is the loss of topsoil (the nutrient-rich surface layer) from the ground. This usually happens because of the movement of air (wind) and water. Heavy rains wash away the soil, especially where the ground slopes and there are no plants, or where plant roots have not yet taken hold.

When the soil is dry, the wind causes erosion. During a period of dry weather (**drought**), wind erosion is a big problem for farmers. They lose huge amounts of rich topsoil to the wind. Farmers often plant **windbreaks**—thick rows of trees and other plants to line their fields and slow down erosion.

Wind erosion is most obvious in dry, desert areas. In regions where there is no sheltering vegetation, the wind can strip off dry soils. Only small particles are carried by the wind. But the force of flowing water, or **hydraulic action**, can move much larger fragments.

The faster the water flows, the larger the fragments are that it is able to shift. Water from rainfall or melting snow that runs downhill often takes particles of rock and soil along with it. Rocks carried along in the water are gradually reduced in size, and become smooth and rounded as they bounce along the riverbed and against each other. This process is called **attrition**, and it happens also to smaller, windblown particles.

Most of the power of wind, water and ice to strip away rocks comes from the abrasive effect of the rock fragments which these mediums carry. This is called **corrasion**. In deserts, windblown sand scours rock surfaces into fantastic honeycomb shapes. Rocks carried by a river current widen the actual riverbed by knocking out more material along the way. Along shorelines, the tides grind sand and pebbles against rock surfaces.

Two Weathering Methods

Weathering, which is a long, slow process, is the continuous breaking down of rock. Weathering can be physical or chemical. **Physical weathering** happens when wind, water, and temperature changes break down rocks into smaller pieces without changing the minerals in the rock. **Chemical weathering** occurs when chemicals created from certain acids, and water, break down rocks. Chemical weathering actually alters the minerals in the rocks.

The two weathering processes work together. Physical weathering exposes new surfaces of rock that can be acted upon more easily by chemical weathering. At any depth accessible to air and water, rocks are weathered physically and chemically. (That's how caves are formed.)

The Role of Roots

The movement of soil particles, or erosion, happens most often when the soil is bare or unplanted. There are two main reasons for this. First, plants set up a barrier to slow and redirect rain running down a hill. When water is slowed down, it cannot carry as much topsoil away. Second, as some plant material decays, it acts like a sponge, soaking up the rainwater. This prevents the water from running off and carrying soil with it.

Did You Know?

Ice is the most powerful erosive force on Earth. All over the world, the effects of ice can be seen in great valleys carved out by moving glaciers during the ice ages. Glaciers can carry huge boulders vast distances.

It takes about 500 years for one inch of topsoil to form. Researchers have found that some soils in India, Africa and Australia are more than 2million years old.

Bibliography & Sources

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by Mike Graf & Marianne Knowles (p9, A113)
Delta Education Inc., 2000

Rocks and Soil
by Robert Snedden (p32)
Raintree Steck-Vaughn Publishers, 1999